

WHAT IS CLAIMED IS:

1. An image output control system comprising an image processing device that makes image data subjected to a preset series of image processing,  
5 and an image output device that creates multiple different types of dots having different densities per unit area according to a result of the preset series of image processing, so as to output an image,

said image processing device comprising:

a dot number determination module that determines a number of dots to  
10 be created in each pixel group, which is set to have a predetermined number of multiple pixels included in the image, with respect to each of the multiple different types of dots according to the image data; and

a number data output module that outputs the determined number of dots to be created in the pixel group with respect to each type of dot, as dot  
15 number data of the pixel group, to said image output device,

said image output device comprising:

a number data receiving module that receives the dot number data of the pixel group with respect to each type of dot;

a priority order specification module that specifies a priority order of  
20 individual pixels in the pixel group for dot creation;

a pixel position determination module that determines positions of dot-on pixels in the pixel group with respect to each type of dot, based on the dot number data of the pixel group with respect to each type of dot and the specified priority order; and

25 a dot formation module that creates the multiple different types of dots at the determined positions of the dot-on pixels.

2. An image output control system in accordance with claim 1, wherein

said priority order specification module selects one out of multiple options for the priority order, which are provided in advance, with respect to the pixel group.

5           3. An image output control system in accordance with claim 1, wherein said number data output module has a dot number combination mapping table that maps each combination of numbers of the multiple different types of dots to a preset code,

            said number data output module refers to the dot number combination  
10   mapping table to convert a combination of the numbers of the respective types of dots determined with respect to the pixel group to a corresponding preset code and outputs the preset code, in place of the dot number data of the pixel group, to said image output device, and

            said number data receiving module comprises:

15           a code mapping table that maps each preset code to a combination of the numbers of the multiple different types of dots; and

            a number data conversion module that receives the output preset code of the pixel group, and refers to the code mapping table to reconvert the received preset code to dot number data of the pixel group with respect to each type of  
20   dot.

            4. An image output control system in accordance with claim 1, wherein said pixel position determination module sequentially determines the positions of the dot-on pixels with respect to each type of dot in a descending order of the  
25   density per unit area of the multiple different types of dots.

            5. An image output control system in accordance with claim 1, wherein said dot number determination module comprises:

a first dot density data generation module that generates first dot density data representing a density of a first dot to be created in the pixel group, based on the image data, where the first dot has a highest density per unit area among the multiple different types of dots,

5 a second dot density data generation module that generates second dot density data representing a density of either of the first dot and a second dot to be created in the pixel group, based on the image data, where the second dot has a second highest density per unit area among the multiple different types of dots;

10 a threshold value group storage module that stores a threshold value group consisting of multiple threshold values, which respectively correspond to the predetermined number of multiple pixels included in the pixel group;

a first dot number determination module that compares the first dot density data with the threshold values included in the threshold value group  
15 and sets a number of threshold values that are smaller than the first dot density data to a number of the first dots to be created in the pixel group; and

a second dot number determination module that compares the second dot density data with the threshold values included in the threshold value group and sets a number of the second dots to be created in the pixel group, based on  
20 the preset number of the first dots and a number of threshold values that are smaller than the second dot density data,

said second dot number determination module comparing the second dot density data with only threshold values that are greater than the first dot density data and counting the number of the threshold values that are smaller  
25 than the second dot density data, so as to set the number of the second dots to be created in the pixel group.

6. An image output control system in accordance with claim 5, wherein

said threshold value group storage module stores the multiple threshold values of the threshold value group in an order of magnitude of the respective threshold value in the threshold value group, and

5       said second dot number determination module selects the threshold values that are greater than the first dot density data, on the basis of the order of magnitude.

7. An image output control system in accordance with claim 6, wherein said first dot number determination module starts comparison of the first dot density data from a threshold value having an ordinal number selected on the basis of a most-recent setting of the number of the first dots, and counts the number of the threshold values that are smaller than the first dot density data.

8. An image output control system in accordance with claim 7, wherein said second dot number determination module, in the case of absence of any threshold value that is smaller than the first dot density data, starts comparison of the second dot density data from a threshold value having an ordinal number selected on the basis of a most-recent setting of the number of the second dots.

20       9. An image output device that receives processed image data, which has gone through a preset series of image processing, and creates multiple different types of dots having different densities per unit area according to the received image data, so as to output an image, said image output device comprising:

25       a number data receiving module that receives dot number data of each pixel group representing a number of dots to be created in the pixel group with respect to each of the multiple different types of dots, as the image data, where each pixel group is set to have a predetermined number of multiple pixels included in the image;

a priority order specification module that specifies a priority order of individual pixels in the pixel group for dot creation;

a pixel position determination module that determines positions of dot-on pixels in the pixel group with respect to each type of dot, based on the dot number data of the pixel group with respect to each type of dot and the specified priority order; and

a dot formation module that creates the multiple different types of dots at the determined positions of the dot-on pixels on an output medium.

10            10. An image output device in accordance with claim 9, wherein said priority order specification module selects one out of multiple options for the priority order, which are provided in advance, with respect to the pixel group.

15            11. An image output device in accordance with claim 9, wherein said number data receiving module comprises:

a code mapping table that maps each preset code to a combination of numbers of the multiple different types of dots; and

a number data conversion module that receives the image data converted in a preset code of the pixel group, and refers to the code mapping table to  
20            reconvert the received preset code to dot number data of the pixel group, which represents the number of dots to be created in the pixel group, with respect to each type of dot.

25            12. An image output device in accordance with claim 9, wherein said pixel position determination module sequentially determines the positions of the dot-on pixels with respect to each type of dot in a descending order of the density per unit area of the multiple different types of dots.

13. An image processing device that causes input image data representing an image to go through a preset series of image processing and thereby generates control data, the control data being supplied to an image output device and used for control of dot formation by said image output device,  
5 which creates multiple different types of dots having different densities per unit area and outputs a resulting processed image, said image processing device comprising:

a dot number determination module that determines a number of dots to be created in each pixel group, which is set to have a predetermined number of  
10 multiple pixels included in the image, with respect to each of the multiple different types of dots according to the image data; and

a control data output module that outputs dot number data of the pixel group, which represents the determined number of dots to be created in the pixel group with respect to each type of dot, as the control data to said image output  
15 device.

14. An image processing device in accordance with claim 13, wherein said control data output module has a dot number combination mapping table that maps each combination of numbers of the multiple different types of dots to  
20 a preset code,

said control data output module refers to the dot number combination mapping table to convert a combination of the numbers of the respective types of dots determined with respect to the pixel group to a corresponding preset code and outputs the preset code as the control data to said image output device

15. An image processing device in accordance with claim 13, wherein said dot number determination module comprises:

a first dot density data generation module that generates first dot

density data representing a density of a first dot to be created in the pixel group, based on the image data, where the first dot has a highest density per unit area among the multiple different types of dots,

5 a second dot density data generation module that generates second dot density data representing a density of either of the first dot and a second dot to be created in the pixel group, based on the image data, where the second dot has a second highest density per unit area among the multiple different types of dots;

10 a threshold value group storage module that stores a threshold value group consisting of multiple threshold values, which respectively correspond to the predetermined number of multiple pixels included in the pixel group;

15 a first dot number determination module that compares the first dot density data with the threshold values included in the threshold value group and sets a number of threshold values that are smaller than the first dot density data to a number of the first dots to be created in the pixel group; and

a second dot number determination module that compares the second dot density data with the threshold values included in the threshold value group and sets a number of the second dots to be created in the pixel group, based on a number of threshold values that are smaller than the second dot density data,

20 said second dot number determination module comparing the second dot density data with only threshold values that are greater than the first dot density data and counting the number of the threshold values that are smaller than the second dot density data, so as to set the number of the second dots to be created in the pixel group.

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16. An image output control method that makes image data subjected to a preset series of image processing and creates multiple different types of dots having different densities per unit area according to a result of the preset series

of image processing, so as to output an image,

said image output control method comprising:

determining a number of dots to be created in each pixel group, which is set to have a predetermined number of multiple pixels included in the image,  
5 with respect to each of the multiple different types of dots according to the image data;

specifying a priority order of individual pixels in the pixel group for dot creation;

determining positions of dot-on pixels in the pixel group with respect to  
10 each type of dot, based on the determined number of dots to be created in the pixel group with respect to the type of dot and the specified priority order; and

creating the multiple different types of dots at the determined positions of the dot-on pixels on an output medium.

15 17. An image output control method in accordance with claim 16, wherein said step for determining a number of dots to be created in each pixel group comprises:

(1-a) generating first dot density data representing a density of a first dot to be created in the pixel group, based on the image data, where the first dot  
20 has a highest density per unit area among the multiple different types of dots,

(1-b) generating second dot density data representing a density of either of the first dot and a second dot to be created in the pixel group, based on the image data, where the second dot has a second highest density per unit area among the multiple different types of dots;

25 (1-c) storing a threshold value group consisting of multiple threshold values, which respectively correspond to the predetermined number of multiple pixels included in the pixel group;

(1-d) comparing the first dot density data with the threshold values



included in the threshold value group and setting a number of threshold values that are smaller than the first dot density data to a number of the first dots to be created in the pixel group; and

(1-e) comparing the second dot density data with the threshold values included in the threshold value group and setting a number of the second dots to be created in the pixel group, based on a number of threshold values that are smaller than the second dot density data,

said step (1-e) comparing the second dot density data with only threshold values that are greater than the first dot density data and counting the number of the threshold values that are smaller than the second dot density data, so as to set the number of the second dots to be created in the pixel group.

18. An image output method that creates multiple different types of dots having different densities per unit area according to processed image data, which has gone through a preset series of image processing, so as to output an image, said image output method comprising:

(A) receiving dot number data of each pixel group representing a number of dots to be created in the pixel group with respect to each of the multiple different types of dots, as the image data, where each pixel group is set to have a predetermined number of multiple pixels included in the image;

(B) specifying a priority order of individual pixels in the pixel group for dot creation;

(C) determining positions of dot-on pixels in the pixel group with respect to each type of dot, based on the dot number data of the pixel group with respect to each type of dot and the specified priority order; and

(D) creating the multiple different types of dots at the determined positions of the dot-on pixels on an output medium.

19. An image processing method that causes input image data representing an image to go through a preset series of image processing and thereby generates control data, the control data being supplied to an image output device and used for control of dot formation by said image output device,  
5 which creates multiple different types of dots having different densities per unit area and outputs a resulting processed image, said image processing method comprising:

(a) determining a number of dots to be created in each pixel group, which is set to have a predetermined number of multiple pixels included in the image,  
10 with respect to each of the multiple different types of dots according to the image data; and

(b) outputting dot number data of the pixel group, which represents the determined number of dots to be created in the pixel group with respect to each type of dot, as the control data to said image output device.

20. A computer program product comprising a medium and an image output control program stored therein, the image output control program is executed by a computer to make image data subjected to a preset series of image processing and create multiple different types of dots having different densities  
20 per unit area according to a result of the preset series of image processing, thus outputting an image,

wherein said image output control program comprises:

a first program code for determining a number of dots to be created in each pixel group, which is set to have a predetermined number of multiple pixels  
25 included in the image, with respect to each of the multiple different types of dots according to the image data;

a second program code for specifying a priority order of individual pixels in the pixel group for dot creation;

a third program code for determining positions of dot-on pixels in the pixel group with respect to each type of dot, based on the determined number of dots to be created in the pixel group with respect to the type of dot and the specified priority order; and

5           a fourth program code for creating the multiple different types of dots at the determined positions of the dot-on pixels on an output medium.

21 A computer program product comprising a medium and an image output control program stored therein, the image output control program is  
10   executed by a computer to create multiple different types of dots having different densities per unit area according to processed image data, which has gone through a preset series of image processing, thus outputting an image,

wherein said image output program comprises:

          a first program code for receiving dot number data of each pixel group  
15   representing a number of dots to be created in the pixel group with respect to each of the multiple different types of dots, as the image data, where each pixel group is set to have a predetermined number of multiple pixels included in the image;

          a second program code for specifying a priority order of individual pixels  
20   in the pixel group for dot creation;

          a third program code for determining positions of dot-on pixels in the pixel group with respect to each type of dot, based on the dot number data of the pixel group with respect to each type of dot and the specified priority order; and

          a forth program code for creating the multiple different types of dots at  
25   the determined positions of the dot-on pixels on an output medium.

22. A computer program product comprising a medium and an image processing program stored therein, the image processing program is executed by

a computer to make input image data of an image go through a preset series of image processing and thereby generate control data, the control data being supplied to an image output device and used for control of dot formation by said image output device, which creates multiple different types of dots having different densities per unit area and outputs a resulting processed image,

wherein said image processing program comprises:

a first program code for determining a number of dots to be created in each pixel group, which is set to have a predetermined number of multiple pixels included in the image, with respect to each of the multiple different types of dots according to the image data; and

a second program code for outputting dot number data of the pixel group, which represents the determined number of dots to be created in the pixel group with respect to each type of dot, as the control data to said image output device.

23. An image output control system comprising an image processing device that makes image data subjected to a preset series of image processing, and an image output device that creates multiple different types of dots having different densities per unit area according to a result of the preset series of image processing, so as to output an image,

said image processing device comprising:

a number calculator that calculates a number of dots to be created in each pixel group, which is set to have a predetermined number of multiple pixels included in the image, with respect to each of the multiple different types of dots according to the image data; and

a data transmitter that outputs the calculated number of dots to be created in the pixel group with respect to each type of dot, as dot number data of the pixel group, to said image output device,

said image output device comprising:

a data receiver that receives the dot number data of the pixel group with respect to each type of dot;

a priority order operator that specifies a priority order of individual pixels in the pixel group for dot creation;

5 a position setter that sets positions of dot-on pixels in the pixel group with respect to each type of dot, based on the dot number data of the pixel group with respect to each type of dot and the specified priority order; and

a dot creator that creates the multiple different types of dots at the set positions of the dot-on pixels.

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24. An image output device that receives processed image data, which has gone through a preset series of image processing, and creates multiple different types of dots having different densities per unit area according to the received image data, so as to output an image, said image output device  
15 comprising:

a data receiver that receives dot number data of each pixel group representing a number of dots to be created in the pixel group with respect to each of the multiple different types of dots, as the image data, where each pixel group is set to have a predetermined number of multiple pixels included in the  
20 image;

a priority order operator that specifies a priority order of individual pixels in the pixel group for dot creation;

a position setter that sets positions of dot-on pixels in the pixel group with respect to each type of dot, based on the dot number data of the pixel group  
25 with respect to each type of dot and the specified priority order; and

a dot creator that creates the multiple different types of dots at the set positions of the dot-on pixels on an output medium.

25. An image processing device that causes input image data representing an image to go through a preset series of image processing and thereby generates control data, the control data being supplied to an image output device and used for control of dot formation by said image output device,  
5 which creates multiple different types of dots having different densities per unit area and outputs a resulting processed image, said image processing device comprising:

a number calculator that calculates a number of dots to be created in each pixel group, which is set to have a predetermined number of multiple pixels  
10 included in the image, with respect to each of the multiple different types of dots according to the image data; and

a data transmitter that outputs dot number data of the pixel group, which represents the calculated number of dots to be created in the pixel group with respect to each type of dot, as the control data to said image output device.

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